EC

Ophthalmology

THIRTY SEVENTH ANNUAL
SPRING CONGRESS IN OPHTHALMOLOGY
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I APPRECIATE THE HONOR WHICH THIS CONGRESS HAS AFFORDED ME TO PRESENT, IN A RATHER BROAD MANNER, SOME OF THE UNIQUE PROBLEMS IN VISUAL REQUIREMENTS OF PERSONNEL OF THE UNITED STATES NAVY. AT THIS POINT, I MUST PREFACE MY REMARKS BY REMINDING YOU GENTLEMEN THAT I AM NOT AN OPHTHALMOLOGIST BUT AN INTERNIST WHOSE CLINICAL INTEREST IN THE EYE, IN ADDITION TO SATISFACTORY VISION, HAS BEEN IN THE OCULAR MANIFESTATIONS OF SYSTEMIC DISEASES. HOWEVER, I AM FAMILIAR WITH THE VISUAL PROBLEMS AND REQUIREMENTS WHICH ARE CREATED BY THE EVER-CHANGING COMPLEXITIES OF MODERN MILITARY VEHICLES AND WEAPONS SYSTEMS. THIS RUNS THROUGH A GAMUT OF UNUSUAL SITUATIONS WHICH ARE PECULIAR TO A MILITARY SERVICE. PROBLEMS MAY EXTEND FROM RATHER MUNDANE SITUATIONS (IN WHICH VISUAL ACUITY ALONE IS CONCERNED) TO SUCH HIGHLY COMPLEX MILITARY TASKS AS CARRIER LANDINGS OF HIGH-PERFORMANCE AIRCRAFT AND MANNED SPACE FLIGHTS.

EFFECTIVE PERFORMANCE OF MILITARY PERSONNEL IN THE COMPLETION OF HIGHLY SKILLED TASKS IS A COMPLEX PHYSIOLOGICAL PROCESS, DEPENDING ON MANY FUNCTIONS OF VARYING RELATIVE SIGNIFICANCE. IN A GENERAL WAY, COMPETENCE IN PERFORMING DIFFICULT TASKS DEPENDS ON SUCH PHYSIOLOGICAL AND PSYCHOLOGICAL FACTORS AS ATTITUDE, MOTIVATION, KNOWLEDGE, TRAINING, CONDITIONED REFLEXES AND COORDINATION OF SENSORY PERCEPTION, RAPID EVALUATION AND MOTOR RESPONSE. THE MORE COMPLEX THE VOLUME OF PRESERVED SENSORY STIMULI IN RELATION TO A CRITICAL

TIME FACTOR, THE GREATER THE REQUIREMENT THAT IS PLACED UPON ACCURATE AND PROMPT INTEGRATION OF ALL ELEMENTS REQUIRED IN MAKING A CORRECT DECISION, FOLLOWED BY EFFECTIVE ACTION. I CAN THINK OF NO BETTER ILLUSTRATION OF THIS COMPLEX RESPONSE THAN OCCURS DURING THE LAST FEW SECONDS OF THE APPROACH TO A CARRIER LANDING. I WILL ATTEMPT, LATER, TO DEVELOP THIS IN MORE DETAIL IN REGARD TO THE SPECIFIC PART PLAYED BY VISUAL DYNAMICS IN RELATION TO THE TOTAL PILOT PERFORMANCE AT THIS CRUCIAL POINT IN LANDING A HIGH-PERFORMANCE AIRCRAFT WEIGHING IN EXCESS OF 20 TONS AND TRAVELING IN EXCESS OF 140 KNOTS WHERE SPEED REQUIRES TREMENDOUS COORDINATION.

ONE OF THE MAJOR CHALLENGES THROUGH THE YEARS TO MILITARY OPHTHALMOLOGY AND ALLIED PHYSICAL SCIENCES HAS BEEN THE EVALUATION OF VISUAL REQUIREMENTS AS IT RELATES TO TOTAL PERFORMANCE IN A VARIETY OF MILITARY TASKS, SUCH AS I HAVE JUST REFERRED TO, IN THE PILOT MAKING A CARRIER LANDING. AS WEAPONS SYSTEMS AND EQUIPMENT BECOME MORE COMPLEX AND SOPHISTICATED, THERE ARE INJECTED NEW LEVELS OF VISUAL RESPONSE WHICH MUST BE IDENTIFIED, STANDARDS ESTABLISHED, AND NECESSARY INDOCTRINATION AND TRAINING CONDUCTED. THIS IS NOT ALWAYS AN EASY TASK; IN FACT, MORE COMMONLY IT IS A VERY DIFFICULT TASK. AT THE TURN OF THE CENTURY, THE PROBLEM WAS RELATIVELY MORE SIMPLE AND CENTERED PRIMARILY IN AREAS OF VISUAL ACUITY AND PERHAPS COLOR PERCEPTION. IT WAS NOT DIFFICULT TO ESTABLISH THAT A QUARTERMASTER ON LOOKOUT ON THE BRIDGE OF A SHIP REQUIRED EXCELLENT DISTANT VISION; THE VISUAL REQUIREMENTS OF A COAL PASSER IN THE FIREROOM WAS MUCH LESS. THIS MAY BE OVER-SIMPLIFYING THE PROBLEM BUT THE POINT I WANT TO MAKE IS THAT THE DEMANDS OF VISUAL

PERFORMANCE WERE PROBABLY MUCH LESS COMPLEX AND DEMANDING THAN THOSE ENCOUNTERED IN THE MODERN NAVY OF TODAY.

AS IT BECAME MORE AND MORE EVIDENT THAT DYNAMIC VISUAL ACUITY WAS BEING INCREASINGLY CHALLENGED BY COMPLEX WEAPONS SYSTEMS AND TACTICS, A DEFENSE RESEARCH VISION COMMITTEE WAS FORMED EARLY IN 1944 AT THE REQUEST OF THE ARMY AND NAVY. IT WAS RECOGNIZED, AT THIS TIME, THAT APPLICATIONS OF VISION IN MILITARY PROBLEMS WERE SO BROAD THAT A COMPETENT FAR-REACHING ORGANIZATION WAS NEEDED - BRINGING TOGETHER A VARIETY OF DISCIPLINES. AS A RESULT, THE ARMY-NAVY NATIONAL DEFENSE RESEARCH VISION COMMITTEE WAS FORMED IN 1944 AND WAS CONTINUED AFTER THE WAR AS THE ARMED FORCES NATIONAL RESEARCH COUNCIL VISION COMMITTEE. THE AFFAIRS OF THIS COMMITTEE WERE INITIALLY ADMINISTERED UNDER A CONTRACT BETWEEN THE OFFICE OF NAVAL RESEARCH AND THE UNIVERSITY OF MICHIGAN. IN SUBSEQUENT YEARS, THE COMMITTEE HAS UNDERGONE MINOR CHANGES AND REORGANIZATIONS. AT THE PRESENT TIME THE COMMITTEE ON VISION IS FUNDED BY THE FIVE SPONSORING AGENCIES, NAMELY, THE ARMY, THE NAVY, THE AIR FORCE, THE FEDERAL AVIATION AGENCY, AND THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. CONTRACT NEGOTIATIONS ARE CONDUCTED WITH THE NATIONAL RESEARCH COUNCIL THROUGH THE OFFICE OF NAVAL RESEARCH. THE COMMITTEE NOW HAS OVER 200 MEMBERS NOMINATED BY THE FIVE SPONSORING AGENCIES AND INTERESTED DIVISIONS OF THE NATIONAL RESEARCH COUNCIL. THE OPERATION OF THE COMMITTEE IS THE RESPONSIBILITY OF AN EXECUTIVE COUNCIL APPOINTED BY THE PRESIDENT OF THE NATIONAL ACADEMY OF SCIENCES. THIS COUNCIL CONSISTS OF 14 MEMBERS, FIVE OF WHOM ARE SPONSOR REPRESENTATIVES APPOINTED FROM NOMINATIONS MADE BY

EACH OF THE FIVE SPONSORS; FIVE MEMBERS ARE NOMINATED BY INTERESTED DIVISIONS OF THE NATIONAL RESEARCH COUNCIL AND FOUR ARE EX-OFFICIO MEMBERS. ANNUAL MEETINGS OF THE COMMITTEE ARE HELD TO REVIEW MUCH OF THE RESEARCH AND CLINICAL INVESTIGATIONS CONDUCTED IN THE BROAD AREA OF VISUAL PERCEPTION AND WORKING GROUPS ARE CONSTITUTED, WHEN NECESSARY, TO STUDY AND SUBMIT ADVICE AND RECOMMENDATIONS TO THE SPONSORS IN SPECIFIC PROBLEM AREAS. THE COMMITTEE CONTINUES TO CONCERN ITSELF IN ANY FIELD OF SCIENCE OR TECHNOLOGY, INCLUDING MATHEMATICS, PHYSICS, CHEMISTRY, BIOLOGY, PHYSIOLOGY, PSYCHOLOGY, ENGINEERING AND CLINICAL MEDICINE, CAPABLE OF MAKING A CONTRIBUTION TO ITS OBJECTIVES. THE SPECIFIC FIELDS OF ACTIVITY OF INTEREST TO THE SPONSORS ARE AS FOLLOWS:

A. SENSORY AND PERCEPTUAL PROBLEMS OF VISION, INCLUDING COLOR VISION, ACUITY, DEPTH PERCEPTION, PERCEPTION OF PATTERNS AND MOVEMENT, AND THE LIKE.

B. INTERACTION OF VISUAL WITH OTHER SENSORY SYSTEMS.

C. THE PHYSICS, PHYSIOLOGY, AND BIOCHEMISTRY OF VISION.

D. PSYCHOLOGICAL FACTORS IN VISION.

E. VISUAL STANDARDS.

F. VISUAL EQUIPMENT AND PROTECTIVE DEVICES.

G. PROBLEMS IN OPHTHALMOLOGY.

H. PHYSICAL AND GEOMETRICAL OPTICS AS RELATED TO MILITARY EQUIPMENT AND SYSTEMS AS WELL AS TO HUMAN VISION.

THIS COMMITTEE, ITS EXECUTIVE COUNCIL, AND THE VARIOUS WORKING GROUPS, HAVE BEEN OF INESTIMABLE VALUE TO THE NAVY,AND I AM CERTAIN

TO THE OTHER SPONSORS AS WELL, FOR THE IDENTIFICATION, STUDY, AND RESOLUTION OF VISUAL PROBLEMS IN COMPLEX MILITARY SITUATIONS.

I DO NOT PROPOSE TO EXPAND FURTHER ON THE COMPOSITION AND SPECIFIC OPERATION OF THE COMMITTEE AS I SUSPECT MANY OF YOU IN THIS AUDIENCE ARE MUCH MORE FAMILIAR WITH THE COMMITTEE'S BACKGROUND AND PURPOSE THAN I. HOWEVER, I WOULD LIKE TO IDENTIFY SEVERAL MAJOR AREAS IN WHICH WE ARE CONCERNED, WHAT HAS BEEN ACCOMPLISHED IN AN ATTEMPT TO REACH A SOLUTION TO PROBLEMS AND THE RESEARCH AND CLINICAL INVESTIGATION THAT ARE CONTINUING IN THESE AND NEWLY IDENTIFIED AREAS:

A. STANDARD AND ACCEPTABLE METHODS OF EXAMINATION OF THE VARIOUS COMPONENTS OF VISION, SUCH AS, VISUAL ACUITY, ACCOMMODATION, EXTRA OCULAR MUSCLE BALANCE, BINOCULAR FUSION, DEPTH PERCEPTION AND COLOR VISION.

B. THE NEED OF AN ACCEPTABLE METHOD TO DETERMINE THE VISUAL DEMANDS OF A VARIETY OF MILITARY JOBS OR BILLETS.

C. THE DEVELOPMENT OF VISUAL STANDARDS WHICH CAN BE APPLIED TO SATISFY THE VISUAL DEMANDS AS INDICATED ABOVE.

D. NIGHT VISION.

E. COMPLEX DYNAMIC VISION AND VISION CONSERVATION.

AN AREA DEVOID OF ANY SIGNIFICANT DEGREE OF SOPHISTICATION, BUT OF CONTINUING CONCERN, IS THE ESTABLISHMENT OF VISUAL STANDARDS AS RELATED TO VISUAL PERFORMANCE OF A LARGE NUMBER OF WORK OR BILLET ASSIGNMENTS THROUGHOUT THE NAVY. MUCH TIME AND EFFORT AND CONSIDERATION BY WORKING GROUPS IN THE COMMITTEE ON VISION HAVE BEEN DEVOTED TO THIS DIFFICULT TASK. THE OBJECTIVE HERE IS THE

FEASIBILITY OR, IN FACT, THE POSSIBILITY OF DETERMINING IN ANY DEGREE OF DETAIL THE VISUAL PERFORMANCE REQUIREMENTS NECESSARY FOR THE SATISFACTORY COMPLETION OF AN ASTRONOMICAL NUMBER OF DIFFERENT TASKS. COULD THIS BE GROUPED INTO A WORKABLE NUMBER OF CATEGORIES TO WHICH VISUAL PERFORMANCE STANDARDS COULD BE APPLIED? IT WAS RECOGNIZED IN THE CURRENTLY UTILIZED METHODS OF TESTING THAT VISION RELATES PRIMARILY TO MOVEMENTS OF THE EYE AND THE RECEPTION OF SENSORY STIMULI WHICH, TO SOME EXTENT, INDICATE ONLY THAT THE EYE IS PHYSIOLOGICALLY CAPABLE OF RECEIVING AND TRANSMITTING STIMULI TO HIGHER CENTERS. WOULD IT BE POSSIBLE TO CORRELATE THESE FUNCTIONS OF THE EYE, SUCH AS VISUAL ACUITY, BINOCULAR VISION, DEPTH PERCEPTION COLOR, WITH VISUAL PERFORMANCE IN ACCOMPLISHING DIFFICULT TASKS?

VERY FRANKLY, THE NEED IS NOT BEING ADEQUATELY MET AT THE PRESENT TIME PRINCIPALLY BECAUSE CURRENT ANALYSES OF OCCUPATIONAL PROCEDURES ARE NOT SUFFICIENTLY WELL DESIGNED TO YIELD REALIABLE DATA WHICH WOULD INDICATE THE DEGREE TO WHICH VISUAL PERFORMANCE SPECIFICALLY CONTRIBUTES TOWARDS SUCCESS OR FAILURE IN THE ACCOMPLISHMENT OF A SPECIFIC TASK, NOR THE DEGREE TO WHICH EXPERIENCE AND TRAINING IS CAPABLE OF COMPENSATING FOR VISUAL DEFECTS. REGARDLESS OF THE ATTENTION AND STUDY WHICH HAVE BEEN GIVEN TO THIS VERY IMPORTANT ASPECT OF JOB ANALYSIS, PRESENT CONCEPTS OF VISUAL DEMANDS DERIVED FROM OCCUPATIONAL ANALYSIS, DO NOT LEND THEMSELVES TO ACCURATE AND RELIABLE TRANSLATION INTO VARIOUS DIMENSIONS AND VISUAL MEASUREMENT WITH OUR CURRENT TECHNIQUES.

SERIOUS ATTENTION HAS BEEN GIVEN BY THE VISION COMMITTEE TO THE PROBLEM OF VISUAL STANDARDS IN THE MILITARY SERVICES SINCE ITS BEGINNING IN 1944. THIS WAS SUMMARIZED BY DR. HARRY IMRUS IN HIS REPORT TO A WORKING GROUP OF THE COMMITTEE IN 1959 IN WHICH HE REFERRED TO THE WORK THAT HAD BEEN ACCOMPLISHED IN ESTABLISHING STANDARD PROCEDURES FOR VISION TESTING, THE PREPARATION OF MANUALS OF INSTRUCTION FOR TESTING VISUAL ACUITY, AND THE DESIGN AND PREPARATION OF TEST DEVICES SUCH AS WALL CHARTS, VISION SCREENING DEVICES, COLOR MANUALS AND DEPTH PERCEPTION DEVICES. AT VARIOUS TIMES THE VISION COMMITTEE, IN CONSULTATION WITH THE MILITARY SERVICES, HAS PROPOSED VISUAL STANDARDS FOR VARIOUS BROAD CATEGORIES OF PERSONNEL. EXAMPLES OF THIS ARE THE STANDARDS PROPOSED FOR NAVAL AVIATORS IN 1947, FOR COMMISSIONED OFFICERS IN 1950, FOR ENLISTED SUBMARINE PERSONNEL IN 1951, AND FOR OTHER NAVY RATES IN 1951. THE DEPARTMENT OF THE NAVY, THROUGH COMMITTEES INCLUDING QUALIFIED MEDICAL DEPARTMENT PERSONNEL, HAS CURRENTLY CONSIDERED THE QUESTION OF VISUAL STANDARDS FOR VARIOUS CATEGORIES OF COMMISSIONED OFFICERS AND, IN PARTICULAR, VISUAL REQUIREMENTS FOR ADMISSION TO THE NAVAL ACADEMY AS THEY RELATE TO VISUAL PERFORMANCE OF UNRESTRICTED LINE OFFICERS. THE NAVY POSITION INDICATED THAT SUCH STANDARDS SHOULD TAKE INTO CONSIDERATION THE USUAL CHANGES IN VISION RELATED TO AGE AND THE NORMAL TYPES OF DUTY WHICH MIGHT BE EXPECTED OF AN ACADEMY GRADUATE AS HE ADVANCES TO MORE RESPONSIBLE ASSIGNMENTS. THERE WAS CONSIDERATION FOR INITIATING EXTENSIVE LABORATORY RESEARCH ON SIMULATED TASKS IN AN ATTEMPT TO RELATE SUCCESSFUL PERFORMANCE

WITH THE EFFECTS OF AMETROPIC DISABILITIES AND, IF POSSIBLE, TO IDENTIFY ACCEPTABLE LIMITS. HOWEVER, THE DISCUSSIONS WERE INCONCLUSIVE AND THE PROPOSED RESEARCH WAS NEVER ACCOMPLISHED. LATER, A WORKING GROUP UNDER THE CHAIRMANSHIP OF DOCTOR IMRUS ATTEMPTED TO DEVELOP A METHODOLOGY FOR ASSISTING THE ARMED SERVICES IN SETTING THEIR VISUAL STANDARDS IN RELATION TO REQUIRED VISUAL PERFORMANCE.

THE ESTABLISHMENT AND UTILIZATION OF VISUAL STANDARDS CAN BE BROADLY RELATED IN THE FOLLOWING GENERAL AREAS:

1. ENTRANCE - EVEN IN THE ABSENCE OF ACCURATE DATA ON VISUAL PERFORMANCE ANALYSIS OF A VARIETY OF MILITARY JOBS, THERE MUST BE SOME VISUAL STANDARDS ESTABLISHED FOR ENTRANCE ON ACTIVE DUTY. SUCH STANDARDS ARE, OF COURSE, PRESCRIBED AND WHILE THEY MAY BE BASED ON FRAGMENTARY SCIENTIFIC DATA THEY DO APPLY TO VARIOUS CATEGORIES OF COMMISSIONED AND ENLISTED SERVICE. EXAMPLES OF THIS ARE FOUND IN THE NAVY'S MANUAL OF THE MEDICAL DEPARTMENT (CHAPTER 15, SECTION I, ARTICLE 15-10) IN WHICH AN APPLICANT FOR ADMISSION INTO THE NROTC PROGRAM OR THE NAVAL ACADEMY IS REQUIRED TO HAVE 20/20 VISION WITH NORMAL COLOR PERCEPTION. AN APPLICANT FOR DIRECT COMMISSION IS REQUIRED TO HAVE 20/100 VISION - CORRECTABLE TO 20/20. APPLICANTS FOR ADMISSION IN THE STAFF CORPS ARE REQUIRED TO HAVE 20/200 VISION - CORRECTABLE TO 20/20; AND ENLISTED PERSONNEL ARE REQUIRED TO CONFORM TO THE STANDARDS FOR SELECTIVE SERVICE WHICH ARE 20/400 VISION - CORRECTABLE TO 20/20 IN ONE EYE AND CORRECTABLE

TO 20/30 IN THE OTHER EYE. THESE ARE BASIC REQUIREMENTS FOR ACCEPTANCE ON ACTIVE DUTY.

2. ASSIGNMENT - IN AN ATTEMPT TO RELATE VISUAL ACUITY TO SPECIFIC JOB ASSIGNMENTS, BOTH OFFICERS AND ENLISTED MEN MUST MEET SPECIFIC STANDARDS AS APPLIED TO DIFFERENT TASKS, E.G.: A SIGNALMAN, AVIATION BOATSWAIN'S MATE AND QUARTERMASTER MUST HAVE 20/20 VISION; AN AVIATION MACHINIST'S MATE IS ACCEPTABLE WITH 20/30 VISION, PROVIDED IT IS CORRECTABLE TO 20/20 IN EACH EYE; AN INSTRUMENT MAN AND A SURGICAL MAN ARE REQUIRED TO HAVE 20/100 VISION PROVIDED IT IS CORRECTABLE TO 20/20; CONSTRUCTION ELECTRICIANS, EQUIPMENT OPERATORS, AND CONSTRUCTION MECHANICS ARE ACCEPTABLE WITH ANY VISUAL ACUITY PROVIDED IT IS CORRECTABLE TO 20/20 VISION. SOME OF THESE RATINGS REQUIRE NORMAL COLOR PERCEPTION - SOME DO NOT.

I MUST AGREE THAT SELECTION ON THIS TYPE OF ARBITRARY STANDARDS IS NOT BASED ON HIGH SCIENTIFIC PRINCIPLES. IT IS OBVIOUS THAT IN ALL INSTANCES 20/20 VISION IS REQUIRED FOR THE PERFORMANCE OF THE VARIOUS TASKS IN THE RATING BUT, IN SOME RATES, CORRECTION IS ACCEPTABLE.

3. DISPOSITION - THE DISPOSITION OF OFFICER AND ENLISTED PERSONNEL INCURRING DISABILITIES IN VISION DURING MILITARY SERVICE MUST BE RELATED TO THEIR EFFECTIVENESS AND CONTINUED SERVICE. THIS IS GENERALLY EVALUATED ON THE BASIS OF SUCH FACTORS AS EXPERIENCE, THE NATURE OF DISABILITY AND THE TYPE OF DUTY WHICH THEY ARE REASONABLY REQUIRED TO PERFORM IN VIEW OF THEIR AGE AND RANK OR RATE.

BASIC AND APPLIED RESEARCH IN OTHER AREAS OF SPECIFIC MILITARY INTEREST IS CONDUCTED IN NAVAL MEDICAL RESEARCH LABORATORIES AND IN SELECTED CIVILIAN LABORATORIES AND MEDICAL CENTERS UNDER CONTRACT WITH ONR. TIME DOES NOT PERMIT AN EXHAUSTIVE REVIEW OR PRESENTATION OF ALL PROJECTS OF CURRENT RESEARCH EFFORT BUT I HAVE SELECTED SEVERAL AREAS WHICH I FEEL WOULD BE OF INTEREST TO THIS GROUP.

1. CURRENT RESEARCH PROGRAMS CONDUCTED PRINCIPALLY IN NAVAL MEDICAL RESEARCH ACTIVITIES ARE AS FOLLOWS:

A. STUDIES ON THE CAUSATIVE AGENT OF TRACHOMA. THIS DISEASE WHICH THE WORLD HEALTH ORGANIZATION ESTIMATES AFFLICTS 500 MILLION PEOPLE, PRINCIPALLY IN THE MIDDLE EAST, AFRICA AND SOUTHERN ASIA IS WELL RECOGNIZED AS ONE OF THE MAJOR SCOURGES OF THE WORLD. SOME ANTIBACTERIAL DRUGS HAVE SHOWN LIMITED SUCCESS, BUT THE MAGNITUDE OF THE PROBLEM IN SOCIAL ECONOMIC FACTORS CONTINUE TO GIVE THIS DISEASE A PROMINENT PLACE IN ANY DISCUSSION OF WORLD HEALTH MATTERS. ITS SIGNIFICANCE IN MILITARY OPERATIONS IS IN ITS WIDE ENDEMICITY IN CERTAIN GEOGRAPHICAL AREAS WHERE MILITARY ACTION MIGHT TAKE PLACE. WE ARE FORTUNATE TO WITNESS THE EXCITEMENT OF A CONCERTED ATTACK ON THE MICROBIOLOGY OF THIS DISEASE. THE BREAKTHROUGH OCCURRED WHEN IT BECAME POSSIBLE TO CULTIVATE THE TRACHOMA AGENT IN THE YOLK SAC OF EMBRYONATED EGGS. IT HAS NOW BECOME POSSIBLE TO FULFILL KOCH'S THIRD POSTULATE BY INFECTING HUMAN VOLUNTEERS WITH CULTIVATED STRAINS.

AMONG THE FIRST INVESTIGATIVE TEAMS WHO STUDIED THE TRACHOMA QUESTION WITH THIS NEW LABORATORY TOOL WAS ONE FROM THE NAVAL MEDICAL RESEARCH UNIT NO. 2, AT TAIPEI, TAIWAN. THE NAVAL MEDICAL RESEARCH INSTITUTE OBTAINED FROM NAMRU-2 THE EARLY ISOLATES FROM CASES OF TRACHOMA. THE WORK AT THE INSTITUTE WAS FIRST DIRECTED TO THE CULTIVATION OF THESE AGENTS ON EXPLANTS OF THE BLASTODERM OF CHICK EMBRYOS. THE DEVELOPMENTAL CYCLE OF TRACHOMA STRAINS WAS COMPARED TO OTHER AGENTS OF THE PSITTACOSIS GROUP. ALTHOUGH ALL STRAINS OF THESE AGENTS APPEAR ESSENTIALLY THE SAME WHEN STUDIED BY THIS TECHNIQUE, DIFFERENCES IN MORPHOLOGY WERE SEEN AFTER STAINING FOR GLYCOGEN OR GLYCOGEN-LIKE MATERIALS. THE COMPARATIVE SUSCEPTIBILITY OF CELL CULTURE STRAINS TO INFECTIVITY, IN COMPARISON WITH CHICK EMBRYO, WAS ALSO STUDIED. TRACHOMA IS NOT FASTIDIOUS TO THIS KIND OF HOST CELLS SINCE INCLUSIONS WERE OBTAINED IN MANY TYPES OF CELLS INCLUDING CHICK, RABBIT, MICE, MONKEY AND HUMAN INVESTIGATED BY THIS AND OTHER LABORATORIES. OTHER STUDIES WERE CONCERNED WITH THE ROLE PLAYED BY GLUCOSE, TEMPERATURE, CONCENTRATION OF SERUM, AND DRUG RESISTANCE. THERE HAS BEEN NO REPORT OF NATURALLY OCCURRING SULFONAMIDE RESISTANT STRAINS BUT THERE HAS BEEN ONE REPORT OF THE DEVELOPMENT IN THE LABORATORY OF A SULFADIAZINE-RESISTANT STRAIN. NMRI HAS MADE REPEATED ATTEMPTS TO INDUCE SULFONAMIDE AND CHLOROTETRACYCLINE RESISTANCE IN TRACHOMA WITHOUT SUCCESS.

METHODS OF PURIFICATION OF THE VIRUS IS ONE FACTOR NECESSARY TO THE DEVELOPMENT OF A GOOD VACCINE. THE ONLY SATISFACTORY

METHOD OF GROWING THESE AGENTS IN LARGE NUMBERS IS BY USE OF THE YOLK SACS WITH TRYPSIN AND CENTRIFUGE TO SEPARATE THE VIRUS.

A VACCINE HAS BEEN DEVELOPED BY NAMRU-2 WHICH APPEARS TO HAVE SOME SUCCESS IN IMMUNIZING MONKEYS TO CHALLENGES BY LIVE VIRUS. A FIELD PROGRAM OF IMMUNIZING CHILDREN IN ENDEMIC AREAS OF TAIWAN IS BEING CARRIED OUT BY THIS UNIT. ATTACK RATES IN IMMUNE AND NON-IMMUNE CHILDREN IS BEING STUDIED OVER A 5 YEAR PERIOD (THIS IS THE SECOND YEAR OF THIS STUDY).

AN INFECTIOUS AGENT CLOSELY RELATED TO TRACHOMA VIRUS IS THE AGENT OF INCLUSION BLENORRHEA. THIS IS A TYPE OF FOLLICULAR CONJUNCTIVITIS OF SLOW ONSET AND LEISURELY CLINICAL COURSE BUT CHARACTERIZED BY CONSIDERABLE HYPEREMIA, DISCHARGE, AND PREAURICULAR ADENOPATHY. IT USUALLY ENDS IN RESOLUTION. IT OCCURS SPORADICALLY IN ASSOCIATION WITH SWIMMING POOLS AND IN THE NEW BORN. COMPLICATIONS ARE RARE BUT SYMPTOMATOLOGY IS PROMINENT. THIS AGENT CAN BE GROWN AND STUDIED LIKE TRACHOMA. THE STUDIES AT NMRI PARALLEL THE SAME PROGRAM AS THAT WITH TRACHOMA.

B. CELL CULTURE DIAGNOSIS OF TRACHOMA - ALTHOUGH NOT QUITE EQUAL TO YOLK SAC IN QUANTITY OF AGENT HARVESTABLE, IT APPEARS THAT THE CELL CULTURE METHOD HAS THE DISTINCT ADVANTAGE OF GIVING RESULTS IN A FEW DAYS RATHER THAN THE WEEKS REQUIRED WITH THE EGG YOLK SAC METHOD. AN OPPORTUNITY TO DEMONSTRATE THIS OCCURRED RECENTLY IN A LABORATORY ACCIDENT WHEN SOME INOCULUM SPLASHED INTO THE FACE OF A LABORATORY TECHNICIAN. FIVE DAYS LATER, THE

TECHNICIAN NOTED IRRITATION OF THE RIGHT EYE. THE FOLLOWING DAY, THERE WAS REDNESS, ITCHING, AND SOME PAIN IN BOTH EYES. AN ACUTE BILATERAL CONJUNCTIVITIS DEVELOPED. SIGNS OF ACUTE TRACHOMA APPEARED. ON DAY 6, A SPECIMEN WAS TRANSFERRED TO TUBES CONTAINING SUSCEPTIBLE McCOY CELL CULTURE. ON DAY 8, INCLUSIONS IN THESE CULTURES WERE DEMONSTRABLE AFTER STAINING. FURTHER STUDY IS BEING MADE OF THIS METHOD OF DIAGNOSIS.

C. THE DEVELOPMENT OF AN UNDERWATER CONTACT LENS (AT NMRI) IN RELATION TO AN EXTENDED SERIES OF STUDIES ON THE EFFECTS OF IMMERSION, SUCH AS, ESCAPE FROM SUBMERGED AIRCRAFT OR SURVIVAL FROM SHIPWRECK. NEED FOR GOOD VISABILITY UNDERWATER TO CARRY OUT THESE EXPERIMENTS SUGGESTED THAT A CONTACT LENS MIGHT BE DEVELOPED ENABLING GOOD VISION UNDERWATER. THE CONSTRUCTION OF A CONTACT LENS TURNED OUT TO BE RELATIVELY EASY BY ADDING A SMALL CAP TO THE CORNEAL PORTION OF A "SCLERAL" CONTACT LENS. THE CAP ENCLOSES A SMALL AIR SPACE AND HAS A FLAT FACE. ALTHOUGH NOT QUITE AS COMFORTABLE AS AN ORDINARY CONTACT LENS, IT NEVERTHELESS CAN BE WORN FOR APPRECIABLE PERIODS (UP TO SEVERAL HOURS) AND PERMITS EXCELLENT VISUAL ACUITY BOTH ABOVE WATER AND BENEATH WATER. IT HAS AN APPRECIABLY LARGER FIELD OF VIEW. SOME SUBSTANTIAL INTEREST HAS BEEN GENERATED IN THIS LENS BECAUSE (1) IT PERMITS CORRECTION OF EXISTING REFRACTIVE ERRORS. THE WEARING OF SPECTACLES WITH THE ORDINARY UNDERWATER MASK HAS NOT PROVED PRACTICAL. ALSO, THERE ARE A NUMBER OF OCCUPATIONS SUCH AS PHOTOGRAPHERS, WHO FIND THE FACE MASK VERY INCONVENIENT FOR UNDERWATER CAMERA WORK. THE HAZARDS OF BLAST TO FACE MASKS ARE BELIEVED TO BE AVOIDED, AN IMPORTANT POINT OF CONSIDERATION TO UNDERWATER DEMOLITION TEAMS.

THE INVESTIGATORS ARE NOW IN THE PROCESS OF COLLECTING DATA ON VISUAL ACUITIES AND FIELDS, AS WELL AS GAINING EXPERIENCE WITH APPLICATION TO INDIVIDUALS WHO HAVE HIGH REFRACTIVE ERRORS, MISSION EMPLOYMENT, ETC.

D. RETINAL BURN - ECLIPSE BLINDNESS OR SOLAR-RETINITIS IS A WELL KNOWN CLINICAL ENTITY ASSOCIATED WITH MAN'S OBSERVATION OF THE SUN WITHOUT ADEQUATE PROTECTION. THE CONDITION RESULTS FROM THE HIGH INTRINSIC BRIGHTNESS OF THE SUN'S APPARENT SURFACE AND THE INTENSE THERMAL ENERGY FLUX INTO THE IMAGE AREA ON THE RETINA OF THE EYE. IT IS, THUS, A FORM OF THERMAL BURN OF THE RETINA. ONE POINT OF CONSIDERABLE SIGNIFICANCE IS THAT DISTANCE FROM THE SOURCE OF ENERGY MAY NOT APPRECIABLY REDUCE THE HAZARD OF THE BURN.

A SIMILAR INJURY OF THE EYE MAY FOLLOW EXPOSURE TO OTHER INTENSE ENERGY SOURCES. OF PARTICULAR MILITARY IMPORTANCE ARE THE RETINAL BURNS WHICH MAY FOLLOW THE VISUALIZATION OF NUCLEAR EXPLOSIONS AND LASER DEVICES. BOTH DEVICES OFFER MANY TACTICAL ADVANTAGES AS OFFENSIVE WEAPONS. THEY POSE SERIOUS PROBLEMS TO COMBAT EFFECTIVENESS OF TROOPS. GIVEN ADEQUATE INFORMATION ABOUT THE SOURCE CHARACTERISTICS, TRANSMISSION ATTENUATIONS AND EFFECTIVE APERTURES, SOME PREDICTIONS CAN BE MADE AS TO THE LIKELIHOOD OF A BURN IN A GIVEN SITUATION. ONE STUDY IS UNDERWAY (AT NMRI) TO DETERMINE THE HISTOPATHOLOGICAL CONSEQUENCES OF A THERMAL INJURY TO THE RETINA AND THE FUNCTIONAL LOSSES (SUCH AS REDUCTION IN ACUITY) WHICH WOULD ATTEND A RETINAL BURN. EYE PROTECTIVE DEVICES ARE BEING DEVELOPED (BY THE BUREAU OF NAVAL WEAPONS UNDER CONTRACT).

IN THE EVENT OF A DETONATION OF A NUCLEAR WEAPON, IT IS ASSUMED THAT THE EYES WILL RECEIVE SOME OF THE LIGHT FROM THE FLASH BEFORE ANY PROTECTIVE DEVICE CAN REACT. THIS LIGHT WILL TEMPORARILY REDUCE THE VISUAL SENSITIVITY AND THIS REDUCTION IN SENSITIVITY IS TERMED "FLASH BLINDNESS". IF THE VISUAL DISPLAY (SUCH AS COCKPIT INSTRUMENTATION) THAT THE SUBJECT IS LOOKING AT IS BRIGHT, GOOD VISIBILITY MAY RETURN QUICKLY. AT LOWER LIGHT LEVELS HE MAY BE INCAPACITATED DISASTROUSLY. THE PURPOSE OF A STUDY NOW IN PROGRESS (AVIATION MEDICAL ACCELERATION LABORATORY) IS TO EVALUATE THE EXTENT OF IMPAIRMENT AND THE RATE OF RECOVERY FOLLOWING HIGH INTENSITY FLASHES OF VARIOUS MAGNITUDE AND DURATIONS. CONDITIONS ARE SIMULATED CLOSE TO THOSE THAT A PILOT MIGHT BE EXPOSED TO AND PRACTICAL ANSWERS ARE SOUGHT. THE EFFECTIVENESS OF VARIOUS FLASH BLINDNESS PROTECTIVE DEVICES IS BEING EVALUATED.

E. CELLULAR PHYSIOLOGY OF VISION - ANOTHER AREA OF INTEREST IS TO KEEP ABREAST OF THE DEVELOPMENTS IN THE MORE FUNDAMENTAL EXPLORATORY STUDIES OF THE RETINA AT THE CELLULAR LEVEL. SUCH STUDIES PERMIT IMPROVED UNDERSTANDING OF BASIC MECHANISMS OF VISION, PROVIDE A BETTER FOUNDATION FOR ESTABLISHING CORRECT CRITERIA FOR SELECTION AND UTILIZATION OF VISUAL CAPACITIES. SOME EXCITING SUCCESSES HAVE BEEN ATTAINED IN DETECTING COLOR DISCRIMINATING MECHANISMS IN THE RETINA. TO DATE, NO ADEQUATE THEORY OF COLOR VISION HAS BEEN PROPOUNDED. ATTEMPTS TO PROVIDE PHYSIOLOGICAL DATA TO SUPPORT OR DISPROVE THE SEVERAL THEORIES HAVE ONLY RECENTLY BEEN MET WITH SUCCESS. ELECTROPHYSIOLOGICAL TECHNIQUES ARE ONE OF THE EXCITING TOOLS OF THIS ELECTRONIC AGE. IT HAS PERMITTED

INDIVIDUAL CELLS IN THE BODY TO TELL US THEIR ROLE. WE NOW BEGIN TO UNDERSTAND HOW LIGHT IS TRANSLATED INTO THE NEURAL MESSAGES THAT CARRY THIS INFORMATION TO THE BRAIN. THE NAVY SUPPORTS INVESTIGATIONS THAT KEEP IT ABREAST OF DEVELOPMENTS AT THIS FRONTIER OF RESEARCH (NMRI).

THE OFFICE OF NAVAL RESEARCH CONTINUES TO FUND A NUMBER OF OUTSIDE CONTRACTS RELATING TO VISION. THEY HAVE EXPRESSED INTEREST IN THE EFFECT OF LIGHTING ON SUBMARINE HABITABILITY. THEY SUPPORT WORK ON LOW-LEVEL VISIBILITY STUDIES, ACQUISITION OF TARGETS, BOTH BY SHIPBOARD AND AIRCRAFT PERSONNEL. THEY HAVE SPONSORED SURVEYS OF OPERATIONAL ACTIVITIES TO DETERMINE THE CURRENT OPERATIONAL PROBLEMS THAT NEEDS ASSISTANCE. THEY HAVE ALSO SUPPORTED STUDIES OF VISIBILITY FROM THE AIR. OF PARTICULAR INTEREST TO THE ANTI-SUBMARINE WARFARE PEOPLE IS THE POSSIBILITY OF DETECTING SUBMARINES. THEY HAVE APPROVED RESEARCH ON CARRIER DECK LIGHTING AND THE VISUAL CUES NECESSARY TO LAND AT NIGHT. THEY FUND THROUGH THE NAVAL RESEARCH LABORATORY (NRL) A STUDY ON THE VISIBILITY OF EARTH'S SURFACE OBJECTS FROM ORBITING SATELLITES. THIS STUDY, UNDER THE DIRECTION OF PROFESSOR S. Q. DUNTLEY, UNIVERSITY OF CALIFORNIA, WILL ATTEMPT TO PLACE ON THE GROUND VARIOUS CONFIGURATIONS OF OBSERVABLE OBJECTS AND MEASURE THE ABILITY OF AN ORBITING OBSERVER TO DETECT THESE ACCORDING TO PREDICTION EQUATIONS, DETERMINED ON THE BASIS OF LABORATORY WORK. THE QUESTION AS TO WHETHER OR NOT AN ASTRONAUT CAN SEE OBJECTS ON THE EARTH HAS BEEN MUCH IN THE PRESS SINCE THE RETURN OF GORDON COOPER IN THE FAITH 7. HE CLAIMED TO HAVE SIGHTED A NUMBER OF OBJECTS ON THE EARTH WHICH WERE THOUGHT TO BE WELL BELOW DETECTION. THE POSSIBILITY OF GOOD VISUAL

RESOLUTION IS OF HIGH RELEVANCE TO ANY SURVEILLANCE MISSION.

THE NAVAL MEDICAL RESEARCH LABORATORY, NEW LONDON, CONNECTICUT, HAS HAD A TEAM WORKING ON A NUMBER OF VISIBILITY PROBLEMS WHICH MERIT COMMENT. ONE IN PARTICULAR IS THE FARNSWORTH LANTERN, DEVELOPED PRIOR TO 1958. IT IS A DEVICE TO PROVIDE RED AND GREEN STIMULI UNDER CONDITIONS SIMULATING OPERATIONAL CONDITIONS. THE TEST WILL ESTABLISH WHETHER AN INDIVIDUAL'S COLOR DISCRIMINATION IS SO POOR AS TO BE DISQUALIFYING FOR ALL NAVAL ASSIGNMENTS. THE ASSESSMENT OF COLOR VISION IN MAN IS NOT EASY. A DETAILED ASSESSMENT IS DIFFICULT, REQUIRING CONSIDERABLE TIME, EQUIPMENT, AND TECHNICAL SKILL. SIMPLE TESTS, SUCH AS THE PSEUDOCHROMATIC PLATES ARE USEFUL IN SCREENING COLOR DEFECTIVES BUT SOME OF THE FAILURES CAN PERFORM SATISFACTORILY IN NAVAL MILITARY ENVIRONMENTS. THE FARNSWORTH LANTERN IS DESIGNED TO PICK UP THESE INDIVIDUALS. OTHER WORK HAS RELATED TO SUBMARINE LIGHTING, THE EFFECT OF RED LIGHT UPON DARK ADAPTATION, LIGHT ADAPTATION, AND PARTICULARLY THE USE OF VARIOUS COLOR SCHEMES ON THE VISIBILITY OF LIFE RAFTS, LIFE JACKETS, AND SURVIVAL GEAR. IT WAS LARGELY DUE TO THEIR EFFORTS THAT THE USE OF THE FLUORESCENT INTERNATIONAL ORANGE WAS ADOPTED AS A BEST ALL AROUND COLOR FOR SURVIVAL EQUIPMENT.

THE SCHOOL OF AVIATION MEDICINE AT PENSACOLA, HAS MAINTAINED PRODUCTIVE RESEARCH ALONG TWO LINES. ONE IS IN RELATIONSHIP TO THE SENSORY DISTURBANCES ASSOCIATED WITH SLOW ROTATION. THIS IS PROBABLY THE MOST EXTENSIVE SERIES OF STUDIES IN EXISTENCE ON THE VESTIBULAR SYSTEM AND ITS EFFECT ON OTHER SENSORY SYSTEMS SUCH AS THE EYE AND

AUDITORY SYSTEMS. A PRONOUNCED EFFECT ON THE EYE IS THE INDUCED ROTATION OF THE EYE IN RESPONSE TO VESTIBULAR STIMULATION. THIS CAUSES THE SUBJECT TO SEE APPARENT MOVEMENT IN OBJECTS. UNDER SOME OPERATIONAL FLIGHTS SEVERE DISORIENTATION OF THE PILOT OR CREWMEN CAN RESULT. AUTO-KINETIC MOVEMENT WAS ALSO EXTENSIVELY STUDIED, BOTH IN THE LABORATORY AND IN THE AIR. ANOTHER AREA OF INVESTIGATION CARRIED OUT AT THIS LABORATORY WAS ON THE MEASUREMENT OF VISUAL ACUITY WHEN THE TARGET OBJECT WAS MOVING. THIS IS A SORT OF PURSUIT PROBLEM OF CONSIDERABLE MILITARY INTEREST IN MANY TRACKING OPERATIONS. THE STUDY ATTEMPTED TO EXPLORE EXHAUSTIVELY THE VARIOUS PARAMETERS RELATING TO MOVEMENT OF THE STIMULUS AND ITS DETECTION. THE INVESTIGATORS TERMED THIS WORK DYNAMIC VISUAL ACUITY. UNFORTUNATELY EACH OBSERVER SEEMED TO HAVE A SET OF CONSTANTS WHICH DETERMINED HIS PERFORMANCE BUT THESE CONSTANTS WERE DIFFERENT FROM SUBJECT TO SUBJECT. OF SIGNIFICANCE, HOWEVER, IS THE FACT THAT VISUAL PERFORMANCE FOR MOVING OBJECTS IS NOT ALWAYS RELATED TO AN INDIVIDUALS ABILITY TO DETECT STATIONARY OBJECTS. THUS, SOME INDIVIDUALS PERFORMED BETTER ON FAST MOVING OBJECTS THAN OTHERS WHO PERFORMED BETTER ON STATIONARY OBJECTS.

RECOGNIZING THE IMPORTANCE OF VISION IN A VARIETY OF NAVY ASSIGNMENTS, IT FOLLOWS THAT A PROGRAM OF SIGHT CONSERVATION IS ESSENTIAL IN MILITARY PERSONNEL AND CIVILIANS DIRECTLY SUPPORTING THE NAVY IN THE ACCOMPLISHMENT OF ITS MISSION. THIS WAS INITIATED AS A SPECIFIC PROGRAM IN 1947 AND IS A RESPONSIBILITY OF THE MEDICAL

DEPARTMENT AND INDUSTRIAL SAFETY ENGINEERS. THE PROGRAM HAS AS ITS OBJECTIVE THE PREVENTION OF EYE INJURIES, THE ELIMINATION OF ACCIDENTS RESULTING FROM FAULTY VISION, AND INCREASED PRODUCTIVITY BY CORRECTION OF FAULTY VISION.

OCCUPATIONAL AREAS ARE SURVEYED TO IDENTIFY EYE HAZARDS AND CORRECTIVE ACTION IS TAKEN. FUNDAMENTAL TO THIS IS THE CORRECTION OF REFRACTIVE ERRORS AND THE PROVISION OF PROTECTIVE SPECTACLES OR GOGGLES. IT HAS BEEN DETERMINED THAT MORE THAN 110,000 OF THE NAVY'S 340,000 CIVILIAN INDUSTRIAL EMPLOYEES WORK IN EYE HAZARDOUS AREAS AND, IN RECENT YEARS, OVER 36,000 REFRACTIONS WERE PERFORMED AND 75,000 PAIRS OF SAFETY SPECTACLES WERE ISSUED.

WITH THE INCREASING KNOWLEDGE OF THE BIOLOGIC EFFECTS OF MICROWAVE ABSORPTION AND IONIZING RADIATION IN THE PRODUCTION OF LENTICULAR OPACITIES, A PROGRAM WAS INITIATED IN 1960 REQUIRING SLIT-LAMP EXAMINATION OF THE EYE BY A QUALIFIED OPHTHALMOLOGIST IN ALL PERSONNEL WHOSE ASSIGNMENTS COULD RESULT IN EXCESSIVE EXPOSURE TO THESE PORTIONS OF THE ELECTRO-MAGNETIC SPECTRUM. THIS PROGRAM, LIKE THE SIGHT CONSERVATION PROGRAM, WILL BE A CONTINUING ONE WITH EMPHASIS ON PROTECTIVE SHIELDING, EDUCATION OF PERSONNEL, AND MONITORING TO REDUCE EXPOSURE.

TRAINING - AT THE PRESENT TIME THERE IS A REQUIREMENT FOR 44 FULLY QUALIFIED OPHTHALMOLOGISTS IN THE NAVY MEDICAL DEPARTMENT. THIS IS AUGMENTED BY SOME 60 OPTOMETRISTS AND SPECIALLY TRAINED ENLISTED HOSPITAL CORPSMEN TO ASSIST THE OPHTHALMOLOGISTS. ALL FLIGHT SURGEONS HAVE CONSIDERABLE TRAINING IN THE PHYSIOLOGY

AND METHODS OF EXAMINATION OF THE EYE AS IT PERTAINS TO THE REQUIREMENTS OF NAVAL AVIATION. IN FACT, THE EMPHASIS WHICH HAS BEEN PLACED ON PHYSIOLOGIC OPTICS IN THE SCHOOL OF AVIATION MEDICINE AT PENSACOLA DURING THE FOUR MONTHS' PERIOD OF TRAINING IN AVIATION MEDICINE HAS RESULTED IN A REAL STIMULUS AND INTEREST AMONG FLIGHT SURGEONS TO RECEIVE RESIDENCY TRAINING IN OPHTHALMOLOGY. RESIDENCY TRAINING IN OPHTHALMOLOGY HAS BEEN APPROVED AT THE NAVAL HOSPITALS AT BETHESDA, PHILADELPHIA, SAN DIEGO AND OAKLAND FOR A TOTAL OF 18 RESIDENCY BILLETS. THIS PROGRAM IS AUGMENTED BY THE DEFERMENT OF SERVICE OBLIGATED YOUNG PHYSICIANS FOR CIVILIAN RESIDENCY TRAINING IN OPHTHALMOLOGY UNDER THE SO-CALLED "BERRY PLAN" FOR RESIDENCY DEFERMENT AND COMMISSIONING. AT THE PRESENT TIME, THERE ARE ON ACTIVE DUTY 21 REGULAR NAVY OPHTHALMOLOGISTS WHO RECEIVED THEIR TRAINING IN APPROVED NAVAL HOSPITALS AND 10 RESERVE OPHTHALMOLOGISTS TRAINED IN CIVILIAN HOSPITALS AND CURRENTLY SERVING THEIR TWO YEARS OF OBLIGATED SERVICE. AS AN ILLUSTRATION, DURING THE COMING YEAR OUR ANTICIPATED LOSSES OF OPHTHALMOLOGISTS FROM ACTIVE DUTY WILL BE COMPENSATED BY SIX REGULAR NAVY MEDICAL OFFICERS COMPLETING THEIR RESIDENCY TRAINING AND THREE BERRY PLAN DEFEREES WHO WILL REPORT FOR THEIR TWO YEARS' ACTIVE DUTY. THESE RESIDENCY PROGRAMS ARE VERY POPULAR AND THE TRAINING IS QUITE EFFECTIVE. EACH RESIDENCY PROGRAM IS HEADED BY A BOARD CERTIFIED OPHTHALMOLOGIST WITH ONE OR TWO FULLY QUALIFIED, AND PERHAPS BOARD CERTIFIED, OPHTHALMOLOGISTS AS ASSISTANTS. OUTSTANDING CIVILIAN PHYSICIANS ARE UTILIZED AS CONSULTANTS AND LECTURERS TO AUGMENT THE STAFF IN THE TEACHING PROGRAM. IN ADDITION, INDIVIDUAL AFFILIATIONS HAVE BEEN ESTABLISHED BETWEEN OUTSTANDING

LOCAL PROGRAMS, SUCH AS THE NATIONAL INSTITUTES OF HEALTH AT BETHESDA, THE WILLS EYE CLINIC IN PHILADELPHIA, AND THE UNIVERSITY OF CALIFORNIA AT SAN FRANCISCO. ALL RESIDENTS ARE ENCOURAGED TO PARTICIPATE IN THE HOME STUDY COURSE OF THE AMERICAN BOARD OF OPHTHALMOLOGY. THE MAJORITY ARE SENT TO THE ARMED FORCES INSTITUTE OF PATHOLOGY FOR A PERIOD OF INTENSIVE STUDY IN OPHTHALMIC PATHOLOGY AND ALL ARE SPONSORED BY THE NAVY FOR THE LANCASTER COURSE GIVEN AT COLBY COLLEGE IN MAINE.

IN ADDITION TO THE REQUIREMENT FOR OPHTHALMOLOGY IN A STRICTLY CLINICAL FIELD, THERE ARE SEVERAL BILLETS (SUCH AS THE SCHOOL OF AVIATION MEDICINE AT PENSACOLA AND THE NAVAL MEDICAL RESEARCH INSTITUTE AT BETHESDA) REQUIRED TO CONDUCT AND SUPERVISE ON-GOING RESEARCH PROJECTS IN THIS FIELD.

THIS HAS BEEN A RATHER HURRIED AND NECESSARILY BRIEF DESCRIPTION OF SEVERAL AREAS OF INTEREST OF THE NAVY MEDICAL DEPARTMENT IN THE BROAD FIELD OF OPHTHALMOLOGY. IN CLOSING I WOULD LIKE TO EXPRESS THE APPRECIATION OF THE BUREAU AND ALL OF OUR NAVY OPHTHALMOLOGISTS FOR THE VALUABLE AND CONTINUING ASSISTANCE OF CIVILIAN OPHTHALMOLOGISTS THROUGHOUT THE COUNTRY. THROUGH YOUR SUPPORT, ADVICE AND ENCOURAGEMENT WE ARE ABLE TO OPERATE WHAT MAY POSSIBLY BE THE BEST PROGRAM WE HAVE EVER HAD.

THANK YOU.